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(54) Title: SECURING DEVICE <div style="text-align: center;"> </div>		
(57) Abstract <p>A device (1; 10; 20; 40; 46; 50; 60) for securing two wires together comprises passageways for receiving wires and one or more wedging bodies (6; 7; 18; 33; 34; 41; 44; 59) which may be magnetically attractable to the wires. The wedges are operable to urge the wires towards the passageways or deflect the wires so as to restrict movement of the wires at least in one direction.</p>		

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SECURING DEVICE

This invention relates to a securing device for elongate members such as cables, wires or the like.

GB 2210517 discloses a connector for two wires in which the wires are urged together by spring loaded mechanisms so as to secure the wires to each other. Both wires must be in position before either wire is secured to the device. The device is very difficult to load. Furthermore the springs are made from thin tensile material and are prone to rusting and breaking when in use.

The present invention seeks to provide a securing device for securing an elongate member to another item without these drawbacks.

According to the present invention there is provided a securing device for securing an elongate member to another item, said securing device comprising a body defining a passage operative to receive the elongate member, wherein the securing device comprises a wedge means for urging the elongate member against the part of the body defining the passage so as to frictionally secure the elongate member in the securing device.

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Wires are more easily loaded into the securing devices of the present invention than the devices of the prior art. Preferably the wedge means is not resiliently biased.

According to a second aspect of the invention there is provided a securing device for securing an elongate member to another item, said securing device comprising a body defining a passage operative to receive the elongate member, when the securing device comprises non-resiliently biased wedge means for urging the elongate member towards another part of the device and/or another member so as to restrict movement of the elongate member in at least one direction.

In a preferred embodiment of the invention the wedge means is magnetically attracted to the elongate member. Preferably the wedge means is made from non-corrosive magnetic material or non-corrosive material in which a magnetic field may be induced. Means for inducing a magnetic field in the wedge means may be provided. The wedge means may be deformable. By using a non resilient wedge means the need for moving parts such as springs is eliminated. Thus the device is much more cost effective to make and is more reliable when in use.

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In a preferred embodiment of the invention the elongate member comprises wires, cable, rope or the like and preferably comprises a magnetically attractable material such as metal.

The present invention has particular application in acting as a joint between two cables or the like such that the cables may be pulled in opposite directions away from the device and act as one cable. It can be seen that each cable can usually be secured in the device without the other being present.

The wedge means may comprise a non-circular body rotatable about a fixed axis, the body having a variable depth from said axis to the outermost region of the body such that when the elongate member is located in position movement of the elongate member in one direction causes more of the body to move towards the elongate member so as to wedge it against the passageway. One such rotatable body may be provided per elongate member. Alternatively one such rotatable body may provide the wedge means for two elongate members. Examples of such structures include oval, pear or S-shapes.

The wedge means may be provided in a chamber which opens into the passageway. This chamber may have a

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variable depth from the passageway. Movement of a body, preferably a regular shaped body such as a ball or cylinder through the chamber from the larger to the smaller part of the chamber will result in the body urging the elongate member towards the passageway and securing the elongate member in position.

The wedge means may comprise a body which moves from a first position in which it does not engage the elongate member to a second position in which it engages the elongate member so as to secure the elongate member in position.

When two such arrangements are used both wedge means may urge their respective elongate members in the same direction or opposite directions.

The wedge means may urge the two elongate members towards the centre of the device or away from the centre of the device.

When two arrangements are used one or both of these wedge means may be attracted by one or more magnets. The magnetic field may directly attract the wedge means and/or may attract the wedge means by the magnetic field that extends down the elongate member to the wedge means.

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Serrations or other grips may be provided on the wedge means.

In order that the present invention may be more readily understood specific embodiments thereof will now be described by way of example only with reference to the accompanying drawings in which:-

Fig. 1 is a perspective view of one securing device in connection with the present invention;

Fig. 2 is a perspective view of a second securing device in accordance with the present invention;

Fig. 3 is a perspective view of a third securing device in accordance with the present invention;

Fig. 4 is a perspective view of a further securing device in accordance with the present invention;

Fig. 5 is a fifth securing device in accordance with the present invention;

Fig. 6 is a sixth securing device in accordance with the present invention;

Fig. 7 is a plan view of the securing device of Fig. 6; and

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Fig. 8 is a seventh securing device in accordance with the present invention.

Referring to Fig. 1 a securing device 1 comprises a pre cast zinc housing 2 having apertures (only one of which 3 is shown) on opposite sides thereof for receiving cables 4,5 which pass through the housing 2. Two magnetic oval brackets 6,7 are mounted on a central axis 8 so as to allow rotation thereof about the axis 8. Each oval bracket 6,7 has a varying depth between the axis 8 and the outermost region of the brackets 6,7. In use the two cables 4,5 which may comprise two parts of a broken cable extend through the device 1. Each oval bracket 6,7 engages one of the cables. In use each of the cables 4,5 is magnetically attracted to its bracket 6,7. Further movement of the cable 4,5 in either direction causes the sharp (lowermost as illustrated) ends of the brackets 6,7 to move towards their respective cables 4,5 thus urging the cables 4,5 towards the roof of the device 1 so as to frictionally secure the cables 4,5 against the underside of the roof 9. Once this has been achieved the cable may not be moved further in that direction. If the upper cable 4 as illustrated is moved to the left and the lower cable 5 to the right both cables 4,5 will be secured in position such that the two cables 4,5 are both secured to the securing device 1. The joined cables 4,5 will

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now act as one cable. The cables 4,5 can be released from the securing device 1 by pulling the cables 4,5 through the device 1 in the opposite direction to that which wedged the cables 4,5 in position.

Referring to Fig. 2 a cable securing means 10 comprises a casing formed from upper and lower parts 11,12 each part having a pair of open ended grooves which can run along the length of these parts. When the two parts 11,12 are bolted together by bolts 13 the two pairs of grooves are in register thus defining a pair of passageways 14,15 operative to receive cables 16,17 and the like. The cable securing means 10 further comprises a single magnetic and/or spring loaded oval bracket 18. The principle of operation is similar to that previously described with reference to Fig. 1. Movement of the upper cable 16 to the right as illustrated and/or movement of the lower cable 17 to the left causes the bracket 18 to rotate clockwise such that a larger portion of the bracket 18 urges both cables against the walls defining the passageways 14,15. The frictional contact between the passageway wall, cable and bracket wedges the cables in position. As the clockwise movement of the bracket secures the upper cables in position so that bracket movement also secures the lower cable in position. The two cables are therefore connected and the upper cable may be pulled to the right resulting in the lower cable also

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being pulled in that direction. Consequently the lower cable may be pulled to the left resulting in the upper cable being pulled in that direction also.

Referring to Fig. 3 a cable connector 20 comprises a casing formed from upper and lower parts 21,22 each part having a pair of open ended grooves which run along the length of the parts. When the two parts are bolted together by bolts 23 the two pairs of grooves are in register thus defining a pair of passageways 24,25 operative to receive cables and the like. A rectangular permanent magnet 26 is provided between the two passageways 24,25. Two chambers 27,28 are provided adjacent opposite ends of the magnet 26 inbetween the passageways 24,25. These chambers 27,28 open into the passageways 24,25. Each of the chambers 27,28 has a wide part 29,30 towards the end of the casing and a relatively narrow part 31,32 towards the magnet 26. A ball bearing 33,34 is provided in each chamber 27,28.

In use one end of a metal cable 35 is placed through the lower passageway. The magnetic field of the magnet passes down the cable 35 and attracts the ball bearing 33 in the chamber 27. As the cable 35 is pulled the ball bearing 33 is pulled along with the cable 35 into the narrow part 32 of the chamber 27. The ball bearing 33 wedges the cable 35 in a fixed position. The cable 35 cannot be removed unless the

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cable 35 is pulled towards the right of the picture thus releasing the ball bearing 33 into the wide part 30 of the chamber 28. The upper securing means acts in the same manner with the upper cable 82 being locked in position as it is pulled towards the right and released if pulled towards the left.

Referring to Fig. 4 the cable connector 40 illustrated is similar to that previously described except that the ball bearings of Fig. 4 have been replaced with generally triangular shaped metal bodies 41,42. These bodies 41,42 have a narrow part 43 which resides in the part of the chamber remote from the passageway and a wide part 44 which is adjacent the passageway. Referring to the upper passageway as the cable 45 is pulled through the passageway the magnetic field extends through the cable 45 and attracts the body. The body 42 moves from a first inactive position 42A to a second wedging position 42B which secures the cable in position by urging it towards the passageway wall. The other securing means acts in the same manner. As described with reference to Fig. 3 the upper cable is secured in position by pulling it to the right and the lower cable can be secured by pulling it to the left. Pulling the cables in the opposite directions releases the cable.

Referring to Fig. 5 there is shown a further

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embodiment of the invention 46 similar to that shown in Fig. 4 except that the chambers are provided on the opposite sides of the passageways. The manner of operation is the same as that described with reference to Fig. 4

Referring to Fig. 6 a securing device 50 comprises an upper body portion 51 and a base 52 which is securable to the upper body portion 51 by way of connecting screws 53,54. Two pairs of grooves are provided in both the upper body portion 51 and base 52 such that when the two parts 51,52 are secured together they define two parallel channels 55,56 for receiving elongate members 57 such as wires, cables, rope and the like. A part of each groove in the upper body portion 51 opens into an enlarged chamber 58A, 58B.

The depth of the chambers 58A, 58B is not constant such that the left hand side of the first chamber 58A as illustrated is deeper than the right hand side of that chamber and vice-versa with the other chamber 58B. A cylindrical wedge 59A, 59B is provided in each chamber 58A, 58B. The wedge pieces are made from non-corrosive magnetic material. The dimensions of the wedge pieces 59A, 59B are such that they may move freely in the enlarged part of their respective chambers, but when they move into the

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smaller parts of the chamber they will wedge in position any wire provided in the part of the groove adjacent the chamber.

In use a first metal wire is inserted into the first channel of the device in the direction of Arrow A. The magnetic wedge piece will engage the metal wire and move towards the enlarged part of the chamber. Once a sufficient length of wire has been passed past the chamber the wire is then pulled into a direction opposite to Arrow A. The magnetic wedge piece engages the wire and is captured between the roof of the chamber and the wire thus urging the wire towards the base of the channel and wedging the wire in position. Further movement of the wire in a direction opposite to Arrow A is not possible. In a similar, but opposite manner the second wire is placed into the left hand side of the second channel by pushing it in the direction of Arrow B. Once captured by the wedge piece the wire cannot be moved back out of the left hand side of the channel as illustrated. The device therefore connects two pieces of wire together such that when tension is applied to the cable such that the cables pull the wedge pieces into the small parts of the channel the two cable pieces act as one.

These securing devices are particularly useful in connecting relatively thin wires together such as

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those used in vineyards for connecting vines to supports.

Fig. 8 is a modification of the device of Figs. 6 and 7 in which the device 60 has a channel which is large enough to receive two cables. The device 60 operates in a similar mannner to that previously described. Movement of both cables 61,62 in direction C is restrained by the wedge piece.

The casings of all of the embodiments of the invention preferably comprise metal, such as a zinc alloy.

It is to be understood that the above described embodiments have been made by way of illustration only. Many modifications and variations are possible.

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CLAIMS

1. A securing device for securing an elongate member to another item, said securing device comprising a body defining a passage operative to receive the elongate member, wherein the securing device comprises a wedge means for urging the elongate member against the part of the body defining the passage so as to frictionally secure the elongate member in the securing device.
2. A securing device for securing an elongate member as claimed in claim 1, characterised in that the wedge means is not resiliently biased into an operative position.
3. A securing device for securing an elongate member to another item, said securing device comprising a body defining a passage operative to receive the elongate member, wherein the securing device comprises non-resiliently biased wedge means for engaging the elongate member towards another part of the device and/or another member so as to restrict movement of said elongate member in at least one direction.
4. A securing device as claimed in claim 1, claim 2 or claim 3, characterised in that the wedge means is magnetically attracted to the elongate member.

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5. A securing device as claimed in any preceding claim, characterised in that the wedge means comprises a permanent magnet.

6. A securing device as claimed in any preceding claim, wherein the wedge piece comprises material in which a magnetic field may be induced.

7. A securing device as claimed in any preceding claim, wherein the device comprises means for inducing a magnetic field in the wedge means.

8. A securing device as claimed in any preceding claim, wherein the item to be connected to the elongate member is a further elongate member.

9. A securing device as claimed in any preceding claim, wherein the elongate member comprises wire, cable or rope.

10. A securing device as claimed in any preceding claim, wherein the elongate member comprises material which would be attracted by a magnet.

11. A securing device as claimed in any preceding claim, wherein serrations or grips are provided on the wedge means.

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12. A securing device as claimed in any preceding claim, wherein the wedge means comprises a non-circular body rotatable about a fixed axis.

13. A securing device as claimed in any preceding claim, wherein the wedge means is provided in a chamber opening into the passageway, the chamber having a non uniform depth.

14. A securing device as claimed in claim 13, wherein the wedge means comprises a body which moves from a first position in the chamber in which it does not engage the elongate member to a second position in which it does engage the elongate member so as to secure the elongate member in position.

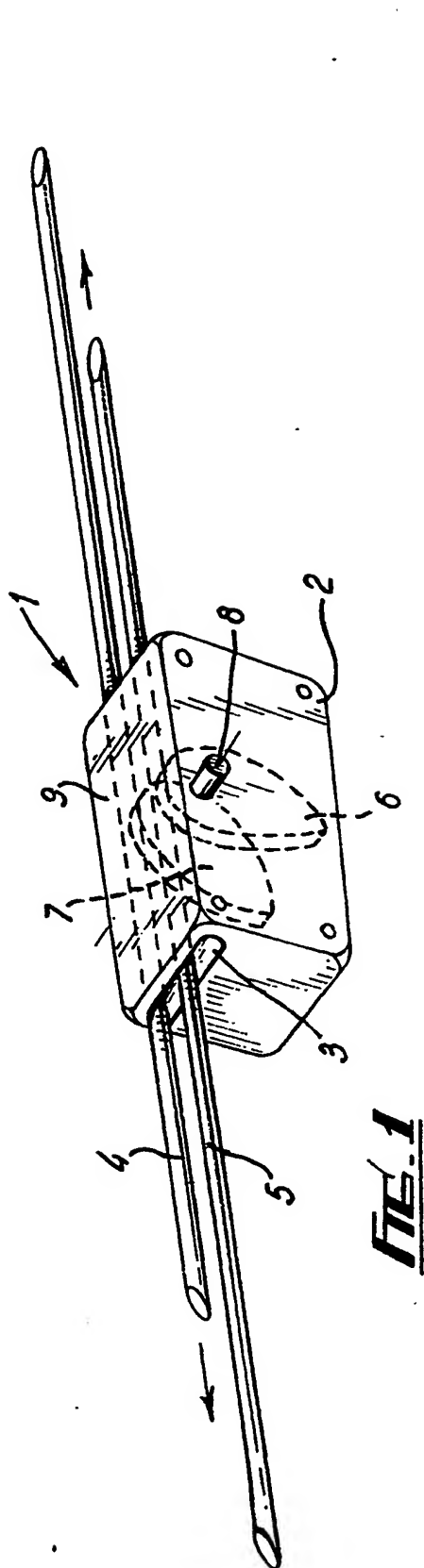


FIG. 1

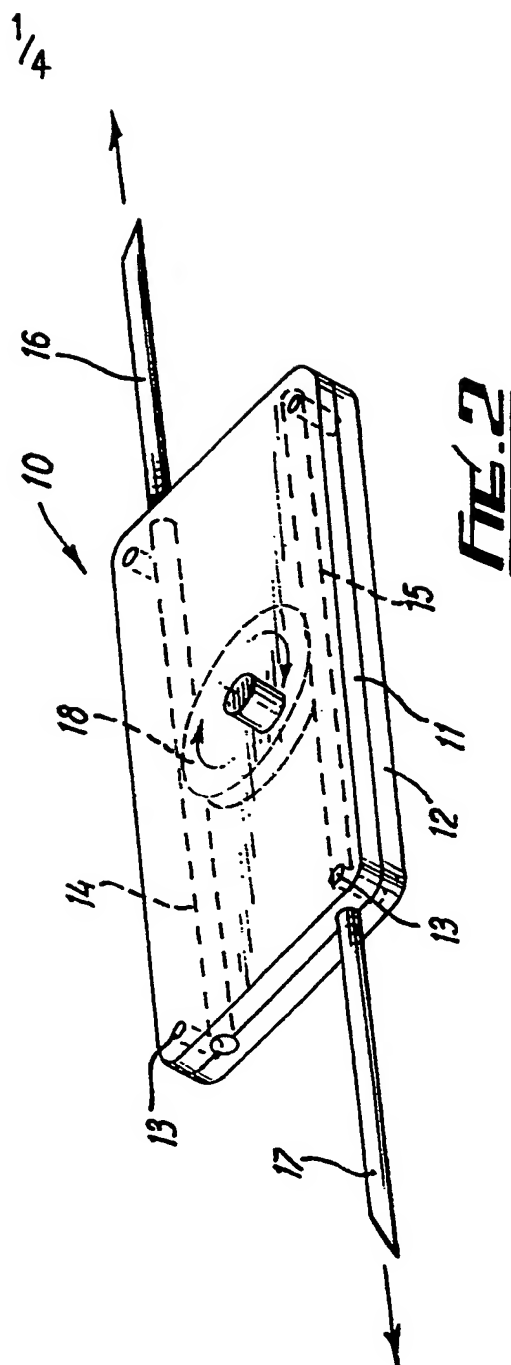


FIG. 2

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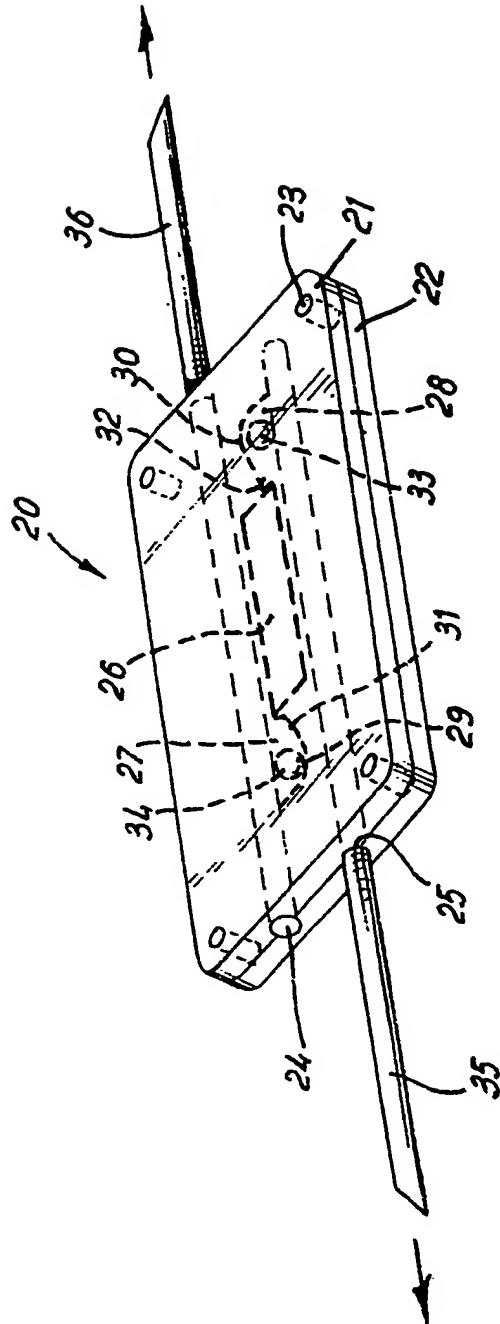


FIG. 3

3/4

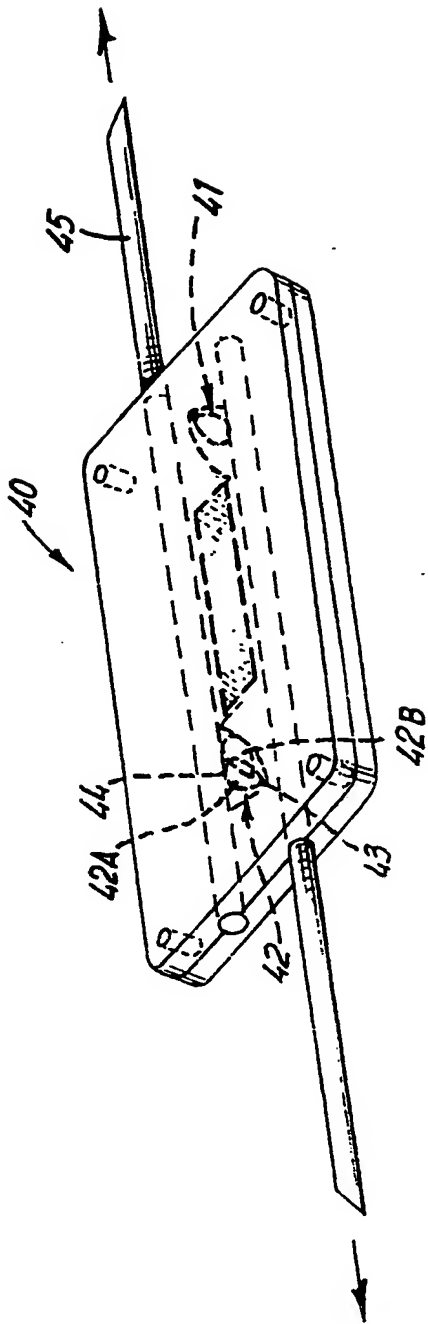


FIG. 4

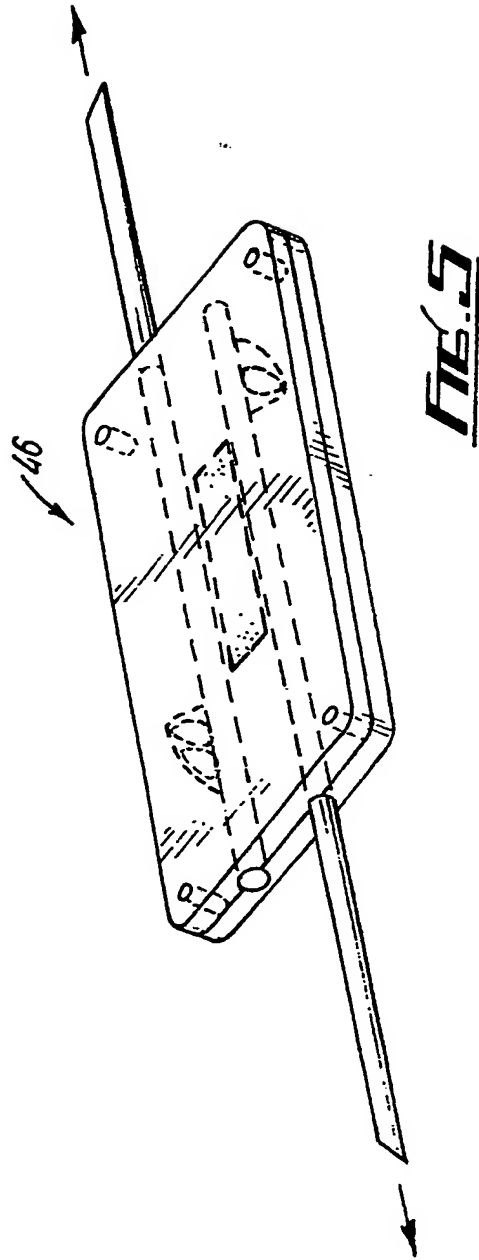


FIG. 5

INTERNATIONAL SEARCH REPORT

International Application No

PCT/GB 92/01536

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) ⁶ According to International Patent Classification (IPC) or to both National Classification and IPC Int.Cl.5 F 16 G 11/04																	
II. FIELDS SEARCHED <div style="text-align: center; border: 1px solid black; padding: 2px;">Minimum Documentation Searched⁷</div> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 30%; padding: 5px;">Classification System</td> <td style="padding: 5px;">Classification Symbols</td> </tr> <tr> <td style="padding: 5px;">Int.Cl.5</td> <td style="padding: 5px;"> F 16 G A 44 B A 44 C H 01 F </td> </tr> </table> <div style="text-align: center; padding: 5px;">Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched⁸</div>			Classification System	Classification Symbols	Int.Cl.5	F 16 G A 44 B A 44 C H 01 F											
Classification System	Classification Symbols																
Int.Cl.5	F 16 G A 44 B A 44 C H 01 F																
III. DOCUMENTS CONSIDERED TO BE RELEVANT⁹ <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th style="width: 10%; padding: 5px;">Category ^o</th> <th style="width: 70%; padding: 5px;">Citation of Document, ¹¹ with indication, where appropriate, of the relevant passages ¹²</th> <th style="width: 20%; padding: 5px;">Relevant to Claim No.¹³</th> </tr> <tr> <td style="text-align: center; vertical-align: top; padding: 5px;">X</td> <td style="padding: 5px;">US,A,4878270 (WESTERKAMP) 7 November 1989, see column 4, line 56 - column 5, line 31; column 5, lines 32-66; figures 7,8,9</td> <td style="text-align: center; vertical-align: top; padding: 5px;">1,2,3,8 ,9,11, 13,14 4,6,7</td> </tr> <tr> <td style="text-align: center; vertical-align: top; padding: 5px;">Y</td> <td style="text-align: center; vertical-align: top; padding: 5px;">---</td> <td></td> </tr> <tr> <td style="text-align: center; vertical-align: top; padding: 5px;">Y</td> <td style="padding: 5px;">FR,A,1351339 (L'AIGLON) 31 January 1964, see page 2, left-hand column, lines 10-21; page 2, right-hand column, lines 21-25; figures 1-4</td> <td style="text-align: center; vertical-align: top; padding: 5px;">4,6,7</td> </tr> <tr> <td style="text-align: center; vertical-align: top; padding: 5px;">X</td> <td style="padding: 5px;">GB,A,2137817 (APPLICATION ART LABORATORY) 10 October 1984, see page 3, lines 33-47; figures 13,14 <div style="text-align: center;">--- -/-</div> </td> <td style="text-align: center; vertical-align: top; padding: 5px;">1,2,3,4 ,6,7,11</td> </tr> </table>			Category ^o	Citation of Document, ¹¹ with indication, where appropriate, of the relevant passages ¹²	Relevant to Claim No. ¹³	X	US,A,4878270 (WESTERKAMP) 7 November 1989, see column 4, line 56 - column 5, line 31; column 5, lines 32-66; figures 7,8,9	1,2,3,8 ,9,11, 13,14 4,6,7	Y	---		Y	FR,A,1351339 (L'AIGLON) 31 January 1964, see page 2, left-hand column, lines 10-21; page 2, right-hand column, lines 21-25; figures 1-4	4,6,7	X	GB,A,2137817 (APPLICATION ART LABORATORY) 10 October 1984, see page 3, lines 33-47; figures 13,14 <div style="text-align: center;">--- -/-</div>	1,2,3,4 ,6,7,11
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<div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p>^o Special categories of cited documents : ¹⁰</p> <p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier document but published on or after the international filing date</p> <p>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p> </div> <div style="width: 45%;"> <p>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step</p> <p>"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.</p> <p>"&" document member of the same patent family</p> </div> </div>																	
IV. CERTIFICATION <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; padding: 5px;"> Date of the Actual Completion of the International Search <div style="text-align: center; padding: 10px;">02-12-1992</div> </td> <td style="width: 50%; padding: 5px;"> Date of Mailing of this International Search Report <div style="text-align: center; padding: 10px;">26. 01. 93</div> </td> </tr> <tr> <td style="padding: 5px;"> International Searching Authority <div style="text-align: center; padding: 10px;">EUROPEAN PATENT OFFICE</div> </td> <td style="padding: 5px;"> Signature of Authorized Officer <div style="text-align: center; padding: 10px;">BARON</div> </td> </tr> </table>			Date of the Actual Completion of the International Search <div style="text-align: center; padding: 10px;">02-12-1992</div>	Date of Mailing of this International Search Report <div style="text-align: center; padding: 10px;">26. 01. 93</div>	International Searching Authority <div style="text-align: center; padding: 10px;">EUROPEAN PATENT OFFICE</div>	Signature of Authorized Officer <div style="text-align: center; padding: 10px;">BARON</div>											
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III. DOCUMENTS CONSIDERED TO BE RELEVANT (CONTINUED FROM THE SECOND SHEET)		
Category °	Citation of Document, with indication, where appropriate, of the relevant passages	Relevant to Claim No.
X	NL,A, 288231 (GOEBEL) 10 March 1965, see page 5, line 29 - page 6, line 3; figure X ---	1,2,3,4 ,6,7,
X	EP,A,0223108 (TRANS-GUARD INDUSTRIES) 27 May 1987, see whole document ---	1,2,3,6 ,8,9,11 ,13,14
X	US,A,1628744 (ROSE) 17 May 1927, see whole document ---	1,10,11 ,13,14
X	WO,A,8901455 (DAVIES) 23 February 1989, see page 3, lines 1-21; figures 1,2 ---	1,11,12
A	GB,A,2210517 (ESTATE WIRE) 7 June 1989 (cited in the application) -----	

**ANNEX TO THE INTERNATIONAL SEARCH REPORT
ON INTERNATIONAL PATENT APPLICATION NO.**

GB 9201536
SA 64209

This annex lists the patent family members relating to the patent documents cited in the above-mentioned international search report. The members are as contained in the European Patent Office EDP file on 08/01/93
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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US-A- 4878270	07-11-89	None	
FR-A- 1351339		None	
GB-A- 2137817	10-10-84	DE-A, C 3411915 FR-A- 2543805 US-A- 4527311	25-10-84 12-10-84 09-07-85
NL-A- 288231		None	
EP-A- 0223108	27-05-87	US-A- 4640538 JP-B- 1056302 JP-C- 1571513 JP-A- 62188838	03-02-87 29-11-89 25-07-90 18-08-87
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